1969 OPERATING SUMMARY

ORANGEVILLE

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.

D.S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

ORANGEVILLE

water pollution control plant

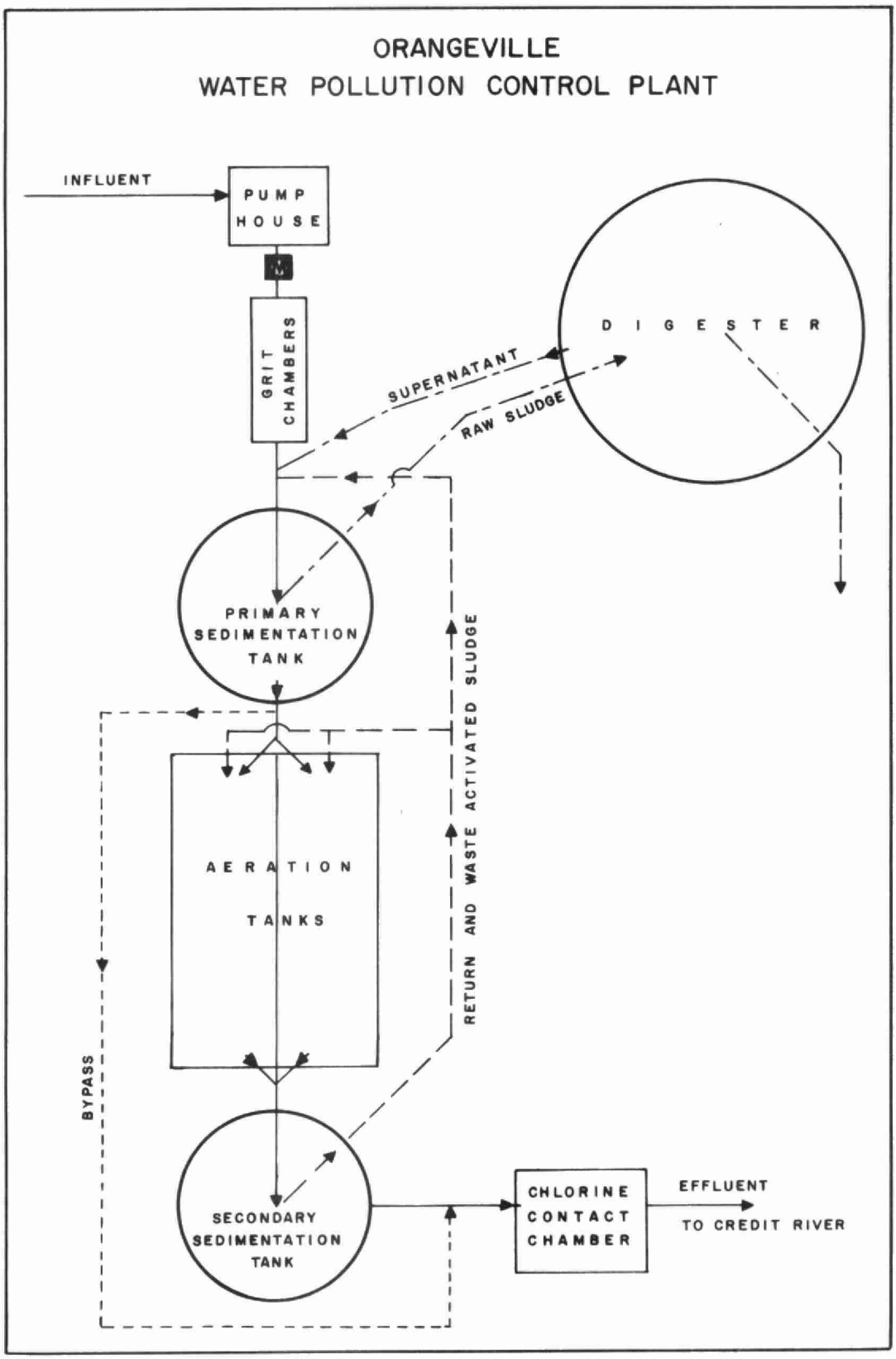
operated for

THE TOWN OF ORANGEVILLE

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY


ORANGEVILLE
WATER POLLUTION CONTROL PLANT
INFLUENT
PUMP HOUSE
GRIT CHAMBERS
DIGESTER
SUPERNATANT
RAW SLUDGE
PRIMARY SEDIMENTATION TANK
AERATION TANKS
RETURN AND WASTE ACTIVATED SLUDGE
BYPASS
SECONDARY SEDIMENTATION TANK
CHLORINE CONTACT CHAMBER
EFFLUENT
TO CREDIT RIVER

DESIGN DATA

PROJECT NO.	2-0208-66	TREATMENT	Activated Sludge
DESIGN FLOW	0.75 mgd	DESIGN POPULATION	7,500
BOD - Raw Sewage	200 mg/l	SS - Raw Sewage	250 mg/l

LIFT PUMPS

Type: Smart-Turner
Size: Two 300 gpm @ 20' tdh
One 500 gpm @ 25' tdh

PRIMARY TREATMENT

Grit Removal

Type: Channels, manually cleaned
Size: Two 25' x 1' 10 3/4" wide
Flow Velocity: 1 fps @ 0.366' depth

Primary Sedimentation

Type: Spiraflow (peripheral feed)
Size: One 35' dia x 12' swd (72,000 gal)
Retention: 2.31 hr
Loading: Surface, 780 gal/ft^2/day
Weir, 7350 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; single-pass
Size: Two 63 X 21 X 12' (198,000 gal)
Retention: 6.33 hr
Diffusers: Dorr Inka

Air Supply

Type: Powlesland-Bailey fan
Size: Two 3200 scfm @ 30" wc

Secondary Sedimentation

Type: Dorr
Size: One 45' dia x 9.17' swd
(97,300 gal)
Retention: 3.12 hrs
Loading: Surface, 470 gal/ft^2/day
Weir, 5820 gal/ft/day

CHLORINATION

Type: W & T
Size: One 75 lb/day

Chlorine Contact Chamber

Size: One 29.75 X 12 X 6.92' (15,400 gal)
Retention: 29.6 min

OUTFALL

- to Credit River

SLUDGE HANDLING

Digestion System - Single-stage

Type: Carter gas mixed, floating cover
Size: One 45' dia x 20' swd (34,500 cu ft or 215,000 gal)
Loading: 1.5 lb/cu ft/mo

'69 REVIEW

GENERAL

The Town of Orangeville developed faster than expected during 1969. As a result, the plant operated at near capacity for the whole year. The digester cover continued to create a major operating problem by failing to float high enough. Gas storage was not sufficient to allow proper function of the gas-fuelled heat exchanger. It is expected that the supplier will modify the roof in 1970.

The Inka aeration system was faulty during the year. Although this did not pose a major problem in plant performance, it would have lowered plant efficiency if unchecked. The contractor was informed of the situation, the problems were expected to be solved in the near future, and a two-year extension of the guarantee was obtained.

EXPENDITURES

The total operating cost of $26,579.37 represents an operating expenditure of $98 for every million gallons of sewage treated. This can be broken down further to show a cost of seven cents for each pound of BOD removed compared with a six-year average of 7.5 cents.

PLANT FLOWS and CHLORINATION

The total flow for the year was 271.2 million gallons, with an average daily flow of 0.74 million gallons. The maximum daily flow of 1.35 million gallons occurred in March, while the minimum 0.44 million gallons occurred in October.

The plant used 10,728 pounds of chlorine during 1969. This amounts to 40 pounds of chlorine per million gallons of sewage treated.

PLANT EFFICIENCY

The average influent BOD and suspended solids were 140 and 195 milligrams per litre respectively, with effluent averages of 7 and 17 mg/l respectively. This resulted in an average reduction of 95% BOD and 89% suspended solids.

The plant removed 494 cu. ft. of grit during 1969 for an average of 3.4 cu. ft. of grit removed per million gallons of sewage treated.

SLUDGE DIGESTION and DISPOSAL

A total of 1,238,000 gallons of raw sludge was treated at the plant; 248,000 gallons were digested, 1,047,000 gallons were returned as supernatant, and 1482 cu. yds. were disposed of by a sludge contractor.

AERATION

An average of 0.74 mgd was treated in 1969. The average BOD and suspended solids removals in the aeration section were 78.5% and 85.1% respectively.

CONCLUSIONS and RECOMMENDATIONS

1. Although the plant operated near design capacity during the year, plant efficiency was maintained. From the probability curves, it can be seen that the BOD and suspended solids in the final effluent exceeded the Commission's objectives only 3% and 17% of the time respectively.

2. Due to the large increase in population, the plant has almost reached its design limits. Expansion of the facilities should therefore be initiated as soon as possible.

3. Digester operation was poor during 1969. For the first two or three months, it was filled mainly with water. Considering this, along with the other problems experienced with the digester, better results could not be expected.

PROJECT COSTS

NET CAPITAL COST (Estimated) Long Term Debt to OWRC	$176,332.46
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	$ 44,503.91
Net Operating	$ 26,579.37*
Debt Retirement	3,558.00
Reserve	691.92
Interest Charged	9,731.99
TOTAL	$ 40,561.28

RESERVE ACCOUNT

Balance @ January 1, 1969	$ 10,398.21
Deposited by Municipality	691.92
Interest Earned	606.46
	$ 11,696.59
Less Expenditures	-
Balance @ December 31, 1969	$ 11,696.59

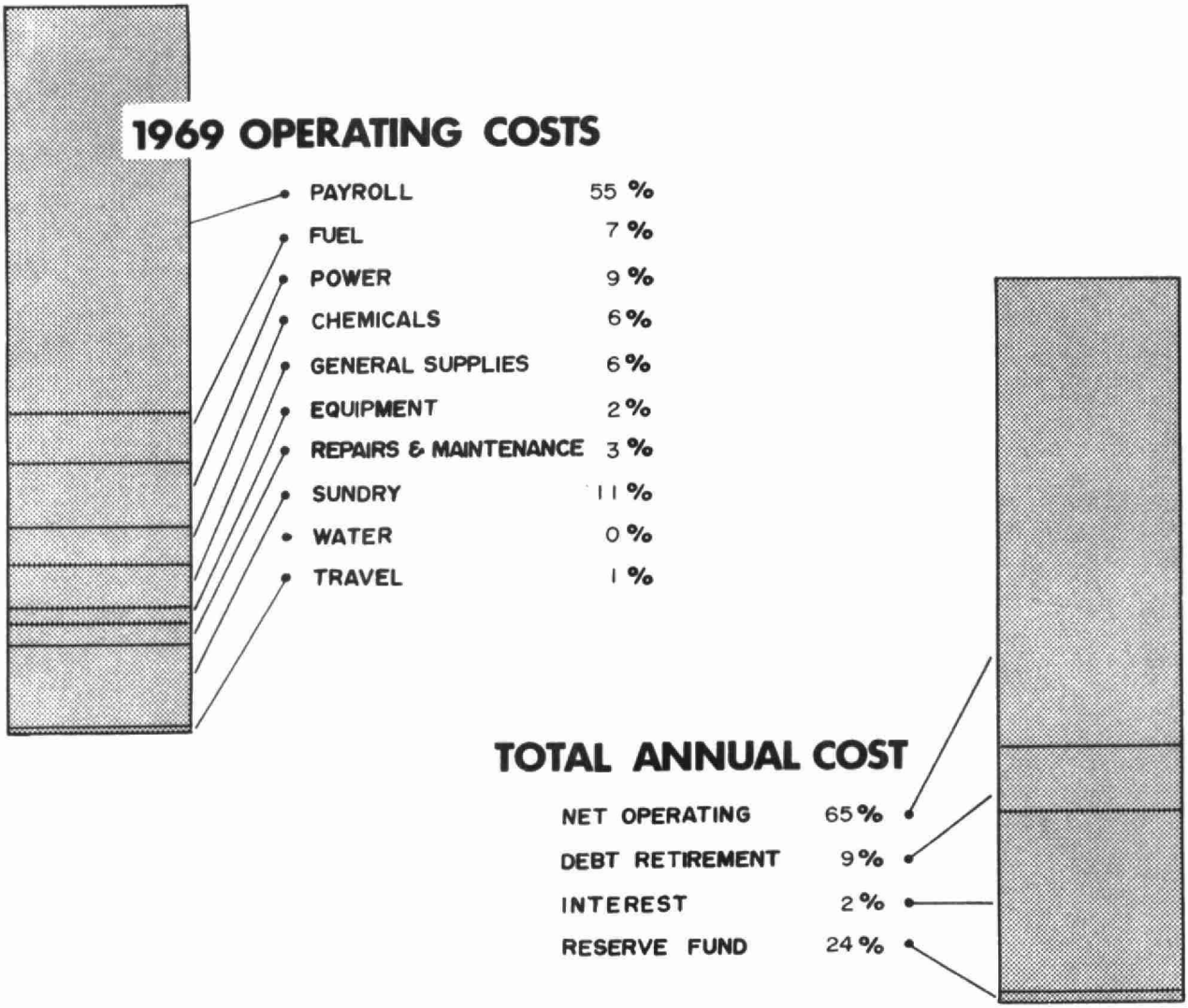
* Includes interest credit of $58.00

EXTENSION - 2-0208-66

NET CAPITAL COST (Estimated)	$512,628.00
DEDUCT - Portion financed by CMHC/MDLB (Estimated)	340,766.31
Long Term Debt to OWRC	$171,861.69
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	$ 2,505.39
Net Operating	$ -
Debt Retirement	2,458.52
Reserve	4,290.10
Interest Charged	14,353.12
TOTAL	$ 21,101.74

RESERVE ACCOUNT

Balance @ January 1, 1969	$ -
Deposited by Municipality	$ 4,290.10
Interest Earned	84.87
	$ 4,374.97
Less Expenditures	-
Balance @ December 31, 1969	$ 4,374.97



Yearly Operating Costs

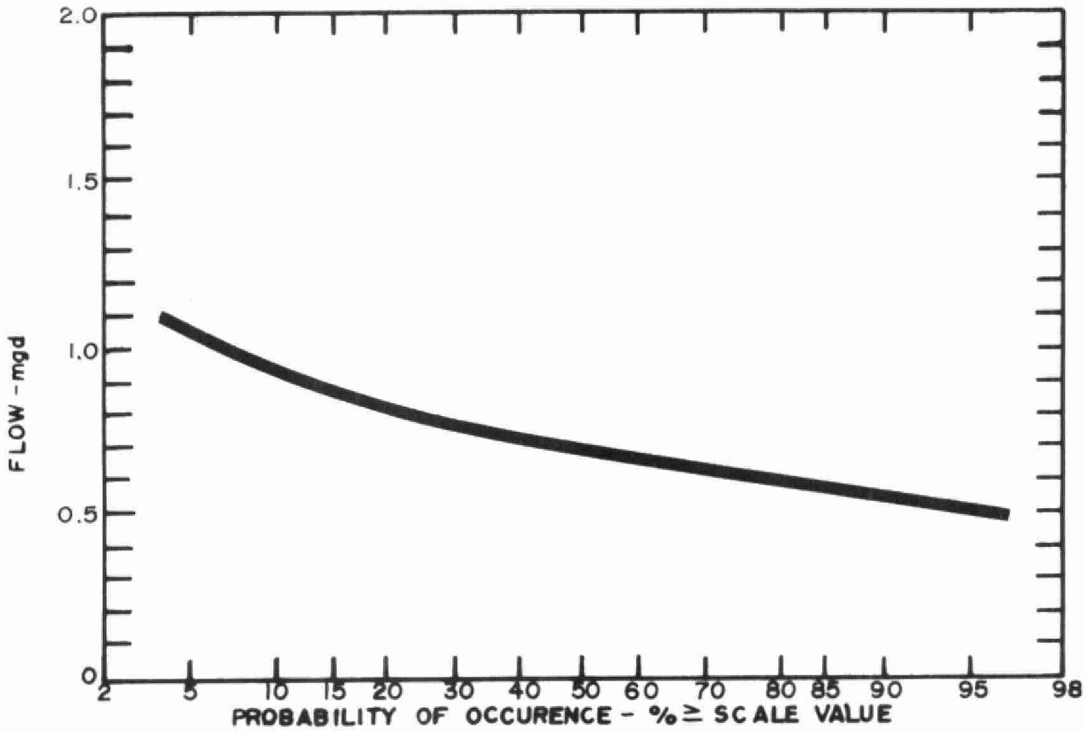
YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	215.85	$13,525.19	$62.66	6 cents
1966	209.50	14,956.60	71.39	7 cents
1967	240.62	15,203.20	63.18	9 cents
1968	233.14	19,337.78	82.94	8 cents
1969	271.20	26,579.37	98.01	7 cents

Monthly Operating Costs

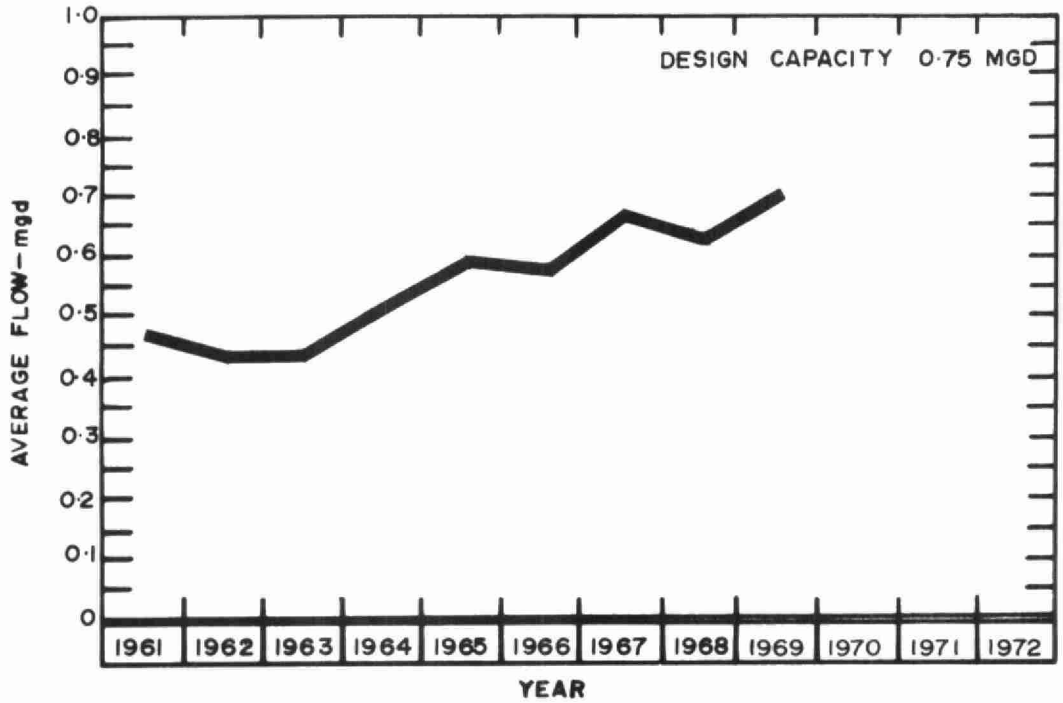
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	1935.53	1486.46	-	231.38	142.95	-	16.84	-	-	57.90	-	-
FEB	2010.24	974.61	-	196.04	218.75	238.61	238.61	30.48	52.08	22.73	-	38.33
MAR	1706.62	974.61	-	203.57	159.30	-	15.24	88.20	213.05	52.65	-	-
APR	2286.09	1153.53	-	198.89	196.54	238.61	94.86	95.69	47.53	240.24	-	20.20
MAY	2130.84	1184.19	-	180.06	205.11	-	364.12	-	-	161.36	-	36.00
JUNE	2198.28	1221.84	129.89	-	179.41	241.50	73.02	-	-	352.62	-	-
JULY	1841.13	1100.93	308.64	116.27	166.03	-	39.65	-	75.80	25.84	-	-
AUG	2355.50	1525.89	17.59	38.20	187.29	220.50	93.82	-	-	272.21	-	-
SEPT	2381.76	1113.01	-	236.88	176.58	274.43	110.47	-	221.51	248.88	-	-
OCT	1711.31	1058.86	-	-	212.37	-	152.38	-	-	287.70	-	-
NOV	2772.38	1124.94	-	305.75	209.15	220.50	370.00	108.99	49.95	317.50	-	65.60
DEC	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	26579.37	13989.03	456.12	1894.77	2270.08	1654.65	1650.11	663.36	883.33	2905.97	-	241.95

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $1678.00

PROCESS DATA

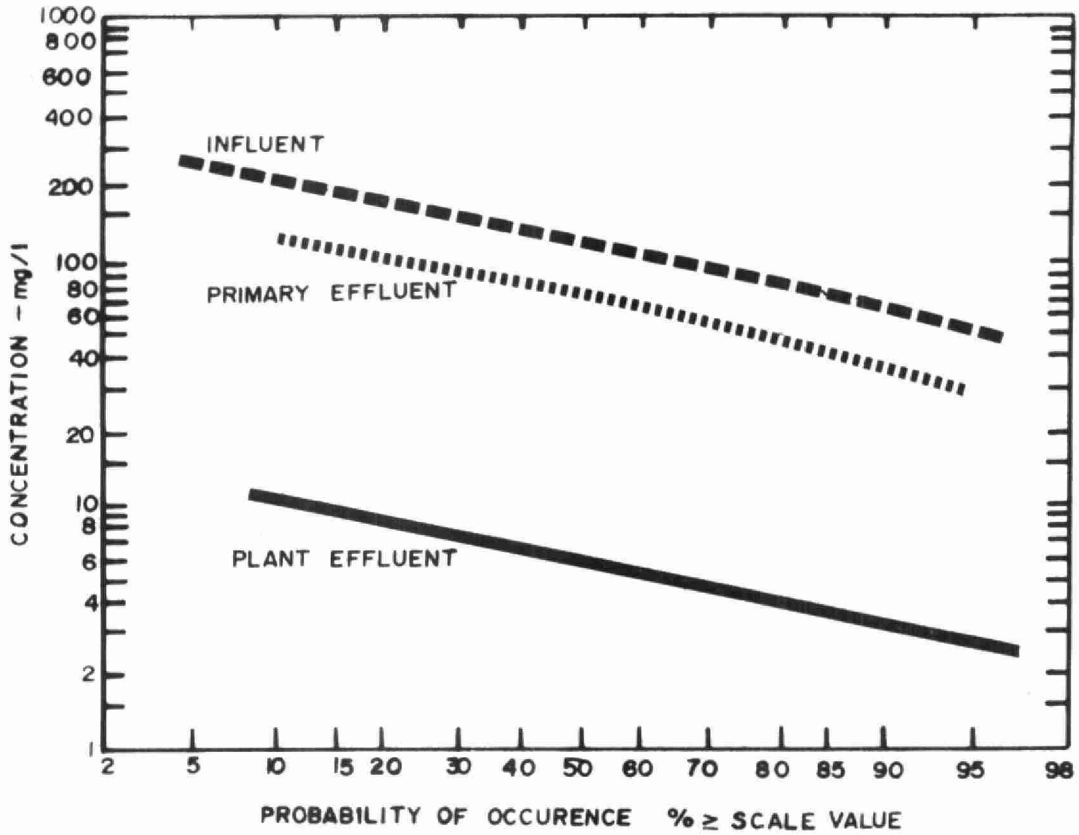


FLOWS

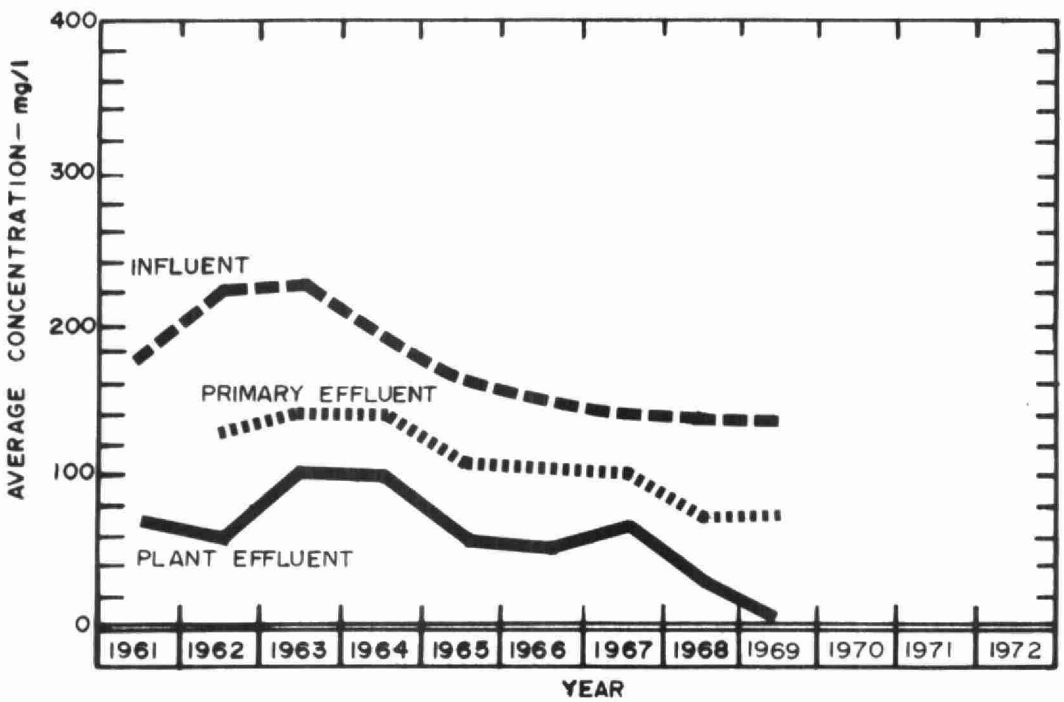


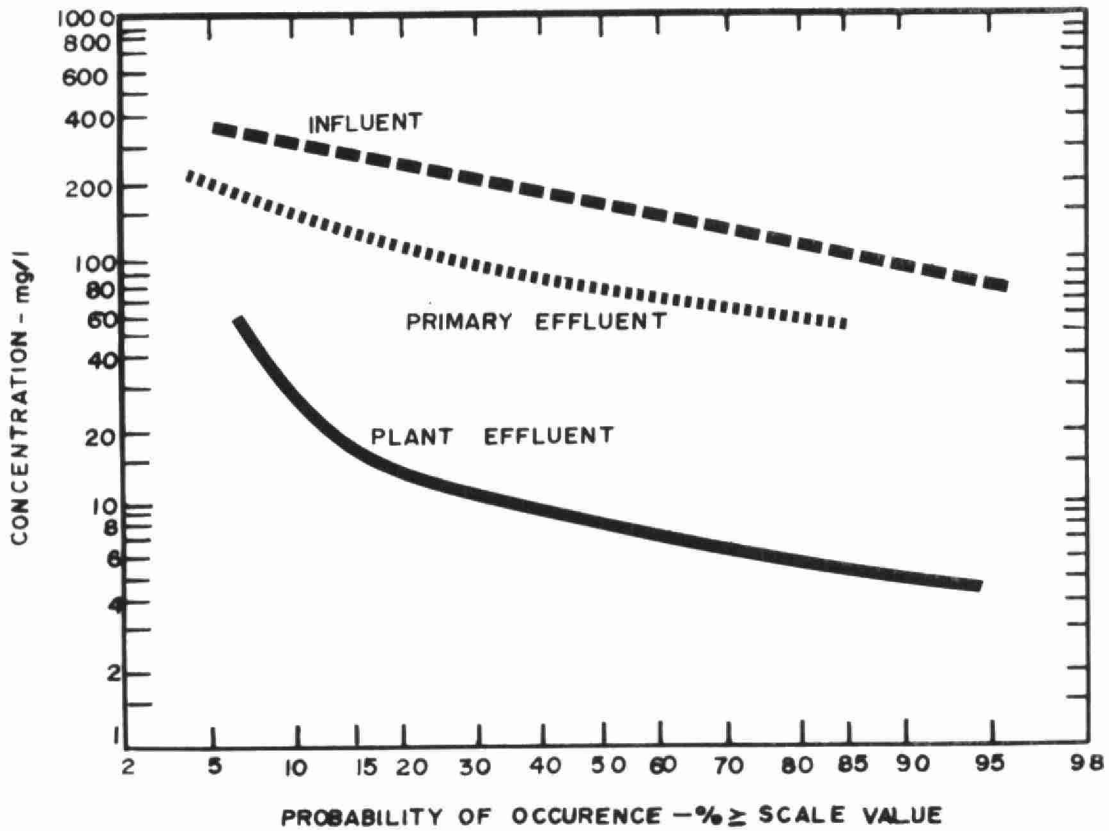
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED pounds	DOSAGE mg/l
JAN	26.0	.84	1.20	.65	784.	3.0
FEB	23.0	.82	1.08	.67	776.	3.4
MAR	28.8	.93	1.35	.67	826.	2.9
APR	29.4	.98	1.03	.90	856.	2.9
MAY	28.3	.91	1.01	.82	932.	3.3
JUNE	22.1	.74	.87	.61	912.	4.1
JULY	19.3	.62	.73	.53	934.	4.8
AUG	18.2	.59	.75	.46	926.	5.1
SEPT	16.9	.56	.65	.46	905.	5.4
OCT	19.3	.62	.78	.44	905.	4.7
NOV	20.8	.69	1.10	.50	970.	4.7
DEC	19.2	.62	.70	.48	1002.	5.2
TOTAL	271.2	-	-	-	10728.	-
AVERAGE	-	.70	-	-	894.	4.0

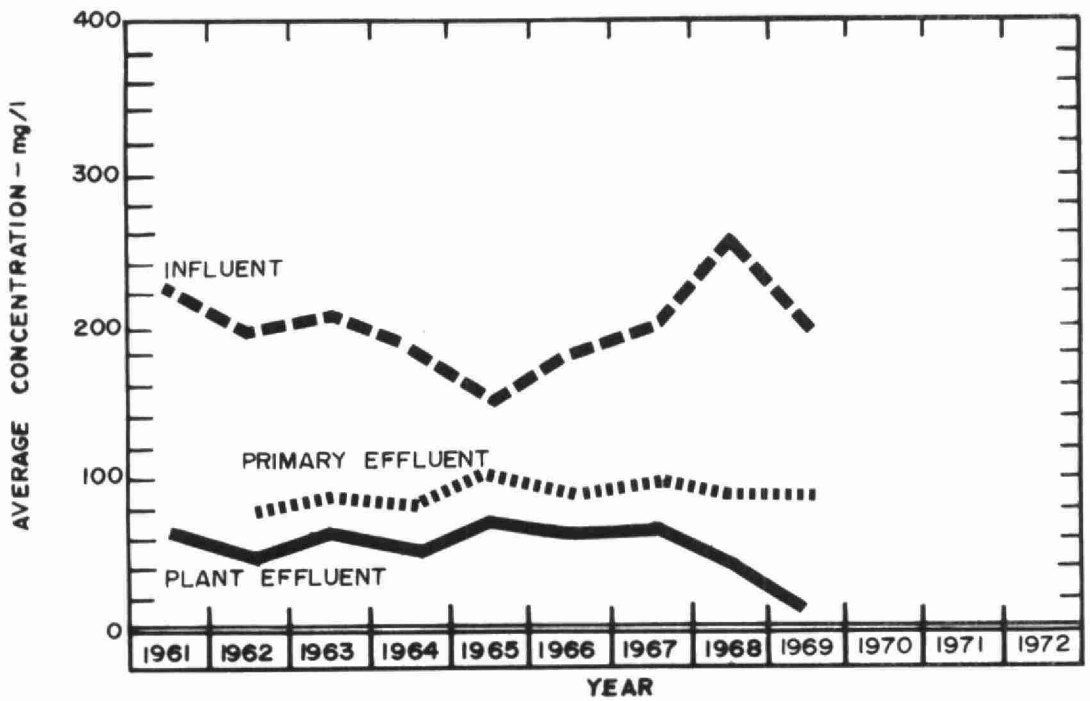


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF.	EFF.	REDUCTION		INF. CONCN	EFF. CONCN	REDUCTION		
	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	cu ft
JAN	240	10	96	59.7	210	10	95	51.9	76
FEB	110	6	94	24.0	230	8	96	51.1	48
MAR	85	9	89	21.9	140	60	57	23.1	0
APR	57	6	84	15.0	80	15	81	19.1	96
MAY	100	3	97	27.4	160	15	90	41.0	60
JUNE	120	5	96	25.4	130	10	92	26.5	120
JULY	200	7	96	37.3	250	15	94	45.4	0
AUG	145	4	97	25.7	170	10	94	29.1	84
SEPT	180	5	97	29.6	240	10	96	38.9	10
OCT	-	-	-	-	-	-	-	-	0
NOV	138	10	93	26.6	340	15	96	67.5	0
DEC	160	7	96	29.3	190	15	92	33.5	0
TOTAL	-	-	-	-	-	-	-	-	494
AVERAGE	140	7	95	29.7	195	17	80	38.8	41

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF. BOD mg/l	AERATION INF. SS CONCN mg/l	SECONDY. EFF. BOD mg/l	SECONDY. EFF. SS CONCN mg/l	M L S S CONCN mg/l	F/M lb BOD / lb MLSS	AIR USED 1000 cu ft / lb BOD	WASTE SLUDGE lb/DAY
JAN	.84	80	70	12	10	1730	.10	8.04	-
FEB	.82	105	155	16	8	1730	.13	6.30	-
MAR	.93	70	80	16	10	1750	.09	9.16	-
APR	.98	43	60	22	18	1780	.06	22.33	-
MAY	.91	80	70	9	15	2100	.09	7.12	-
JUNE	.74	65	60	11	10	1540	.09	11.50	-
JULY	.62	22	90	9	15	1390	.02	57.50	-
AUG	.59	82	80	16	10	1370	.09	11.79	-
SEPT	.56	100	110	20	10	1550	.09	10.27	-
OCT	.62	-	-	-	-	-	-	-	-
NOV	.69	100	100	32	20	1480	.11	9.81	-
DEC	.62	120	80	21	15	1530	.12	13.26	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	.70	79	87	17	13	1640	.09	15.19	-

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^3 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^3 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^3 gal	TOTAL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	76.	-	-	0	-	-	65.	-	0	0
FEB	74.	-	-	0	-	-	48.	-	0	0
MAR	98.	-	-	0	3.6	-	96.	-	0	0
APR	104.	-	-	8.	5.0	-	107.	-	0	48
MAY	118.	-	-	27.	6.0	-	91.	-	0	162
JUNE	121.	-	-	23.	5.2	-	93.	-	0	138
JULY	119.	-	-	23.	4.3	40	94.	-	0	138
AUG	80.	-	-	30.	4.4	-	139.	-	0	180
SEPT	97.	-	-	24.	4.9	-	73.	-	0	144
OCT	118.	-	-	38.	-	-	79.	-	0	228
NOV	113.	-	-	39.	-	-	77.	-	0	234
DEC	120.	-	-	36.	-	-	85.	-	0	210
TOTAL	1238.	-	-	248.	-	-	1047.	-	0	1482
AVERAGE	103.	-	-	21.	-	40	87.	-	0	124

Water management in Ontario